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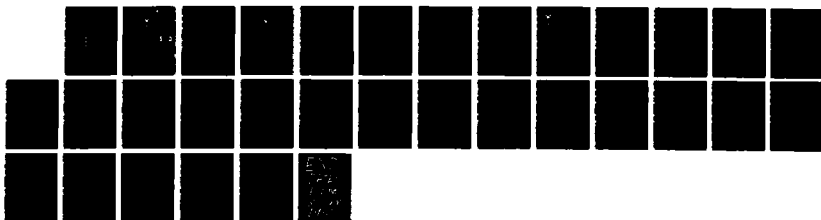
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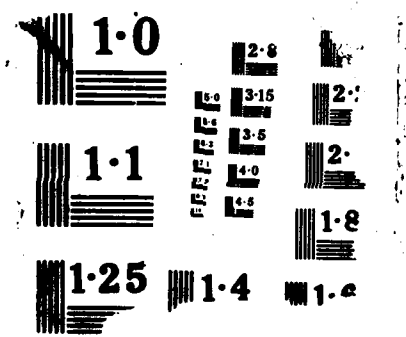
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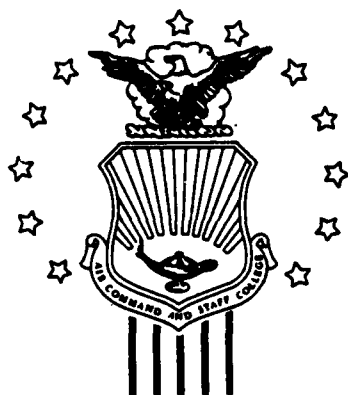




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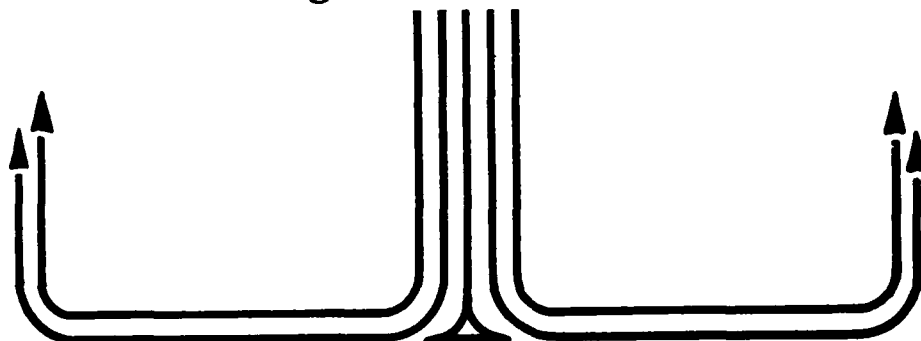
## STUDENT REPORT

MOBILIZING THE U.S. INDUSTRIAL BASE  
IN THE 80s

MAJOR DAVID J. MANCHESTER

88-1640

"insights into tomorrow"



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**REPORT NUMBER** 88-1640

**TITLE** MOBILIZING THE U.S. INDUSTRIAL BASE IN THE 80s

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## PREFACE

One cannot have lived in the United States and been exposed to the news media for the last five years without recognizing that our industrial base is experiencing problems. Even with the tremendous defense build-up of the Reagan administration, our industry is still plagued with problems that are not going away.

The ability to mobilize our industrial base quickly enough to meet the needs of our wartime forces is dependent on a strong industrial base. If we are unable to solve our industrial base problems and keep our industry strong, we may lose the ability to provide our forces with the supplies necessary to defeat our opponent.

This paper is written to identify the major problem areas within industry that are effecting the mobilization ability of the industrial base. It offers a plan which could aid tremendously in solving those problems and ensuring our industry stays strong, competitive on world markets, and has the ability to rapidly mobilize.

My solution draws heavily from the ideas of Mr. Jacques Gansler, a faculty member at Harvard University School of Government. He proposes, and I agree, that our country badly needs a national industrial policy, unfettered by politics, that can be used to provide the incentives and the capital necessary for our industry to regain the strength and competitive edge it once had. That policy should foster an economic climate in which all manufacturers can thrive.



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## ABOUT THE AUTHOR

Major Manchester is a graduate of Worcester Polytechnic Institute with a degree in Management Engineering. He received an MS in Management from Troy State University.

He has operational experience in the F-4, flying over 1300 hours in both American and European environments.

His experience with the industrial base began early as his father owned and operated a small tool and die production company where he worked summers and weekends while in school. His first industrial base experience in the Air Force came when he spent a year working with Sikorsky Aircraft through the AFIT Education With Industry program. At Sikorsky, he was exposed to every major facet of the company, but spent the majority of the time working production planning issues in the machine shop, the development lab, and the Black Hawk helicopter business office.

Following his education with Sikorsky Aircraft, Major Manchester was assigned to the Manufacturing Deputate at Electronic Systems Division as a Manufacturing Engineer. He spent 18 months working various manufacturing and production planning issues and then was selected to become Director of Manufacturing in the C<sup>3</sup>I SPO and later in the AWACS SPO.

He has taken several AFIT-sponsored courses including Introduction to Systems Acquisition Management and Production Management. He has completed the National Security Management Correspondence course and is a member of the Association of the Industrial College of the Armed Forces.



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—“insights into tomorrow”—

REPORT NUMBER 88-1640

AUTHOR(S) MAJOR DAVID J. MANCHESTER, USAF

TITLE MOBILIZING THE U.S. INDUSTRIAL BASE IN THE 80s

I. Purpose: To establish the need for improving the mobilization capability of the U.S. and to offer a plan that will improve our ability to mobilize our industrial base quickly enough to be regarded as a deterrent by our opponents.

II. Problem: The U.S. industrial base is losing its capability to compete favorably in world markets. The result is increasing dependency on foreign suppliers, decreased productivity, and lengthening development times. All of these factors together are causing many of our top officials to be concerned over the ability of our industrial base to rapidly mobilize. If the industrial base is perceived as no longer having the ability to provide the expanded number of critical items necessary for war, our opponents will no longer regard it as a major deterrent. Worse yet, if we are attacked and the industrial base is unable to respond quickly enough, the outcome of the war could be devastating.

III. Analysis: The U.S. government is leaving the industrial base to fend for itself. U.S. industry is competing in world markets with other countries that have a well established national industrial policy. We have an industrial policy of sorts, but it is ineffective and at times even adversarial. The DOD is attempting to improve the defense industrial base, but those attempts are not

## **CONTINUED**

being supported well by Congress. Congress, even in the light of the recent Packard Commission Report, has taken no internal action to improve its abilities to aid the industrial base. If government does finally take action, it will have to be action that affects our entire industrial base, not just the defense sector. The defense sector is too diverse to impact without taking action in the remaining sectors. A national industrial policy is needed. Industry needs government support to sustain its research and development capabilities, improve its production processes technology, make fundamental decisions about when and where to spend capital outlays, improve the integration of civil and defense production, provide incentives to increase productivity, and develop education programs that will ensure that we have the people who can develop and work with the technology necessary to keep our industrial base a great deterrent to war.

IV. Conclusions: The U.S. industrial base is not keeping up with the advancements of the developing countries. We are losing our competitive edge. If we are to remain a world power, industrial base improvement must be hastened. We cannot afford the perception of having an industrial base that cannot support its nation's war time needs.

V. Recommendations: Government must establish a national industrial policy. It cannot be just protectionist measures designed to give our industry the edge in domestic markets. The entire industrial base must be made more productive. Measures must be introduced that incentivize our industry to become more competitive. We must join the rest of the world's nations in providing our industrial base with the support and incentives necessary to ensure that U.S. industry maintains the ability to compete in the world's markets.

## Chapter One

### INTRODUCTION

#### OBJECTIVES

This paper will examine the ability of the U.S. Industrial base to mobilize to meet the needs of our nation during wartime. Industrial mobilization is defined by Dr. Franz A. P. Frisch of the Space and Naval Warfare Systems Command as simply the industrial growth according to the national need in wartime (15:1). A healthy industrial base should be competitive in peacetime world markets, satisfy the peacetime needs of the nation, and have the growth potential to support the rapidly increasing needs of our nation during a major war. Most will agree that the U.S. Industrial base cannot do all three (10:46). After the years of buildup during the Reagan administration, one would think that the American industrial base is broad and strong. Unfortunately, this is not the case. In fact, our industrial base has actually contracted (10:46). Even worse, if we enter a war of attrition, it cannot be made ready in time to prepare goods for battle before those goods presently stockpiled are exhausted (13:11-12). We are in danger of losing the deterrence of what has been for years perceived by foreign nations as one of our strongest assets.

This paper will show, through a graph which displays the current industrial base readiness state, the forecasted ability of the industrial base to respond to a major war of attrition. In addition, the major factors that are impacting the ability of the industrial base to respond to an extended war of attrition will be identified and analyzed.

After identifying the primary factors which are affecting the wartime readiness of the industrial base, the major actions government and industry are taking to improve our response capability will be investigated. This investigation will include an assessment of how effective our actions are in improving the industrial base response capability.

Finally, a plan will be presented that may be what is needed to improve the ability of the industrial base to support a major conflict. This plan treats the commercial and defense sectors of the industrial base equally. The industrial base is too complex and interdependent to take action in any one sector without affecting other sectors. Data provided by the U.S. Department of Commerce and analyzed by a group from The Industrial College of the Armed Forces shows that the defense sector industries perform in parallel with those in the non-defense sector (1:37). Since both sectors perform in parallel, the plan will work to improve the entire industrial base with the belief that by improving all industrial capabilities we will improve those in the defense sector.

### ASSUMPTIONS

This paper is based on several assumptions. First, our next war will be one of major proportions, requiring the entire country to be mobilized. This means that the major industrialized countries of the world, as well as many of the third world countries, will be involved.

Next, the war will be a conventional one, nuclear and chemical weapons will not be used, and will eventually become a war of attrition as did both previous world wars. This means that a successful outcome is based on combat sustainability or the ability of the U.S. industrial base to provide combat commanders with the men, material, ships, tanks, aircraft, and munitions necessary to carry out Grand Tactics (13:2A).

Our current allies will remain wartime allies. We are so interdependent on both the European Common Market countries and Japan that going to war without them would be beyond the scope of this paper. Also, the Soviet Union and its supporters will be the primary opponent.

The war will be fought somewhere other than the North American continent. The most probable locations are Europe, the Middle East, and South Asia.

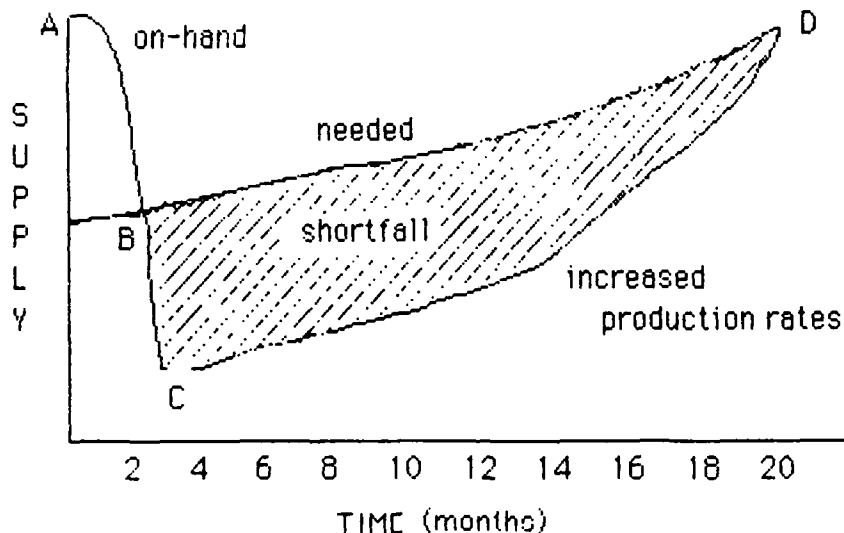
Finally, the United States will not be directly attacked. If our cities and major industrial complexes come under attack and are destroyed, major problems and issues will be posed that are well beyond the scope of this paper.

This scenario was developed and played in Global Game 86, the most extensive war game in the Western world and held at the U.S. Naval War College, Newport,

R.I., 14 July - 1 Aug 1986. Designed to approximate current thinking on how a war between the U.S. and Soviet forces would evolve, it employed over 700 individuals from all branches of the armed forces, U.S. Government, industry, and academia (13:2). The assumptions made in this paper were validated by the War Resources Working Group--the name chosen for the War Production Board Cell--during Global War Game 86. "The group acted as the surrogate for the organizations, agencies, and processes that exist, or would be created, to manage and direct the total mobilization of the economic and human resources of the nation in full-scale, protracted conflict" (13:1).

### PROBLEM STATEMENT

The best way to show the problem with our current readiness and ability to respond is through the use of a graph. The graph was made by Mr. Al Bottoms, Navy Chair at the Defense Systems Management College, who functioned as the chairman of the War Resources Working Group. He used the graph to depict the typical situation that occurs when the initiation of hostilities and accelerated procurement of critical items begin at the same time as sustained demand for critical items.



Supply available versus time (13:16)

The graph shows the supplies on-hand lasting a very short time--only a matter of weeks. Once the supplies on-hand have reached the point where they no longer meet the needs, Point (Pt) B, the war will have to be fought at decreased pace and tempo until the production rate can be increased to the point where production equals demand (Pt D). The time period between Pt C and Pt D is the subject of this paper. If we are to win a major war, that period of shortfall, where production cannot meet the demand, must either be eliminated or held to the absolute minimum. If our opponent is able to fight a war with no shortfall concerns, and our strategy must take into account shortfalls, the result could be devastating. Faced with defeat due to inadequate supplies, the only alternatives left to combat commanders would be surrender or nuclear escalation.

Global War Game 86 provided many examples of potential shortfalls between desired expenditure rates and available supplies. Production base analyses of the supplies on hand and the time required for the industrial base to supply the needed quantities confirm the potential shortfalls. Although it is difficult to confirm the exact shortfall between production and demand, what is important is that there is a shortfall (13:11-12). The plan presented in this paper proposes actions that will either eliminate or minimize that shortfall.

The next chapter will examine the major issues that are contributing to our shortfalls. The follow-on chapter will enumerate the actions taken to resolve those issues and analyze their effectiveness.

## Chapter Two

### MAJOR FACTORS

There are numerous factors that are affecting the mobilization ability of the U.S. industrial base to support a full scale conflict. Many of these factors are being experienced for the first time. Foreign dependency is one factor that the U.S. has not previously had to deal with; we have always been nearly self-sufficient. Foreign competition is another factor we now have to deal with on a much larger scale. We are finding fewer people who have the experience, ability, and education to manage or work in the technical environments (10:49). Over-burdening Congressional legislation is another new factor industry is being forced to cope with. In addition to all these relatively new factors, we are seeing many instances of decreased productivity, poor quality, the lengthening of development times and production rates, and a reluctance by contractors to develop and apply new technology (5:18). All of these factors will be analyzed in detail.

We are experiencing a growth of foreign dependency across a broad spectrum of weapon systems. It exists at all levels of production from parts to end items. A study done by the Analytic Sciences Corporation found that "if foreign sources are cut off, the availability of new and replacement systems and parts will drop to zero for a matter of months or years" (14:1-1). Norman Jonas says, "In industry after industry, manufacturers are closing up shop or curtailing their operations and becoming marketing organizations for other producers, mostly foreign" (6:57). He goes on to identify some U.S. manufacturers as "hollow corporations", where they import components or products from other countries and simply put their name on them for resale in America (6:57). Mr. George T. Nickolas, Chief Review and Compliance Division at the U.S. Army Armament Munitions and Chemical Command at Rock Island, feels that the dependence on uncertain foreign sources is endangering the very foundation of our defense capabilities (8:38).

Foreign competition and the off-shore migration of production necessary to survive in today's competitive environment are major causes for concern of the industrial base. The practice of buying foreign goods is having the effect of reducing the capacity and even eliminating some major industries. Examples are



the forging industry which has lost 40 percent of its sales since 1981 and the bearing industry which now imports three-fourths of the miniature bearings used in domestic production (8:40). American manufacturers are finding that it is more profitable to import goods rather than build them domestically.

By buying foreign goods we are losing the opportunity to develop production and design engineers. Colleges and universities are not supplying us with the numbers of scientists and engineers necessary to make the significant technological breakthroughs we have made in the past. Without a production base to support engineers and scientists and a corresponding exposure to day-to-day operations within that production base, those professionals will lose the expertise necessary to compete in foreign markets. Examples of this "brain drain" have already occurred. Intel Corporation had to go to Malaysia to find the expertise to set up a computer chip assembly line (8:41). A top TRW executive and former director of defense research and engineering at the Pentagon, Dr. John S. Foster Jr., asserted "On the basis of these trends, the U.S. can look ahead to an era where most of the new, important scientific discoveries and commercially important technological breakthroughs will occur elsewhere" (10:49).

Along with problems within industry, Congressional legislation attempting to improve the industrial base has gone too far. Dr. Donald A. Hicks, Under Secretary of Defense Research and Engineering, is concerned that the legislation of the last few years is moving us in the wrong direction, blurring the lines of authority and responsibility (4:13). Army Material Command commander, General Richard Thompson, and Navy Deputy Chief of Naval Operations for Logistics, Vice Admiral Tom Hughes, both feel the rash of new legislation has gone too far in providing specific details on how to achieve lower prices and improved reliability of weapon systems (9:20). Senator Sam Nunn said that "Congress has become 535 individual program managers who are micromanaging the Defense Department" (9:20). Duncan Holiday from the Office of the Secretary of Defense for Production and Logistics feels the government is imposing bureaucratic, arbitrary rules that deliver no added value to programs and are acting as disincentives to contractors (2:45). These disincentives range from the stretch-out in the frequency and reduction in the amount of progress payments to the demand that bidders on new systems make a larger up-front investment in production tooling to across-the-board caps on allowable independent research and development costs. The cumulative effect according to John Rittenhouse, head of the General Electric-RCA aerospace group, is about a 25% reduction in pre-tax profits (2:45). This reduction in profits combined with the up-front risks that are being imposed is what Bob Trimble, head of contracts at Martin Marietta Corporation, says is causing fewer and fewer

sub-contractors to work for the government. Rather than accept government contract work, they find work in the non-defense sector. This is significant since on the average 45-60 percent of government contract work is done by sub-contractors (2:45). The increase in risk is also having an effect on the design efforts major contractors are willing to put into government contracts. Weyman B. Jones, Grumman vice-president of public affairs, stated, "as contractors are required to shoulder more of the risk, their design efforts will become more technically conservative because they will have to bear the costs of exploring promising, but potentially blind, technical alleys" (7:40).

In addition to problems with foreign competition, offshore production, and an over-zealous Congress, industry is suffering from a decrease in productivity resulting in increased cost of weapon systems, lengthening development times, and stretched-out production rates (10:46). Michael D. Rich and Edmund Dews of the RAND Corporation found that over the past 30 years aircraft are being produced 50 percent slower. They attributed the reduced delivery rate to two major factors: the inability of production technology to match advances in aircraft design and the failure to keep monthly production investment rates in line with increased unit costs. The average monthly investment has remained level while the unit costs have increased. In terms of 1975 dollars, the B-47 and B-52 had monthly production investments of 120 million dollars. Since 1960, no program investment rate has gone much beyond 80 million dollars. The result has been a decline in monthly production rates and an increase in the time necessary to complete production (3:28). Rich and Dews also found that the unit costs were increasing whenever production rates were less than estimated. They attributed the increase in unit price to the inflexible production line technology used by most defense contractors and their suppliers. They say, "Although industry has partly re-equipped and automated some plants since the 1960s, defense manufacturing is still as inflexible as it was decades ago" (3:30).

Compounding the severity of all of these issues is the atmosphere in which we must work to find a solution. We can expect a reversal of the defense budget buildup along with much higher costs of a new generation of weapon systems. The budget issues pertaining to defense spending are important, but the need for upgrading the industrial infrastructure and revitalizing industrial strength is becoming a problem that can be postponed no longer. Solutions have to be found that will allow new generations of weapons to be produced much more efficiently. All branches of the government, DOD, and industry have to work together to develop a better, more efficient and productive acquisition process (5:18). Their response is critical.

## Chapter Three

### OUR NATION'S RESPONSE

The U.S. has responded to its industrial base problems. That is significant, for the most important part of any solution is recognizing that a problem does exist. This chapter will review and analyze the major initiatives taken by government, DOD, and industry. Seven major responses will be covered: acquisition streamlining, the Industrial Modernization Incentives Program (IMIP), the MANTECH or Manufacturing Technology program, work measurement standard application, increased competition, Congressional legislation, and multi-year contracting. These programs present a good view of the types of programs being implemented, the areas being emphasized, and their over-all effectiveness.

The solution that is the most far-reaching is that of acquisition streamlining. Called a "cultural change" in how the Department of Defense does business, it calls for a major shift in the attitude and method that industry, DOD, and Congress employ in dealing with one another in the fielding of military systems (2:44). Bob Trimble, chief of contracts at Martin Marietta Corporation, predicted that "unless acquisition streamlining reverses the present trend, by the year 2000 United States technology leadership will have ground to a halt and we'll be unable to field a state-of-the-art military system" (2:44). The major objectives addressed by acquisition streamlining are (1) revitalizing the industrial base, (2) reducing the cost of quality, (3) improving the relationship of government and industry, (4) improving not only the training but the work environment of the people who work in acquisition, and (5) regulatory reform (2:46). Former Deputy Assistant Secretary of Defense for Industrial Productivity and Quality, Richard Stimson, said that the main target of acquisition streamlining is people. Mr. Stimson feels that a process needs to be implemented that causes people to accept the requirement for change and prevents them from going back to the same old ways of doing business (2:47). He feels that it will take five to ten years to overcome the resistance to the changes called for in the acquisition streamlining objectives. Today, he feels, "we are at the critical mass, very close to the breakthrough" when people will wonder why we did not always do things this way (2:44). While acquisition streamlining has an excellent potential for improving industrial base

preparedness and has been somewhat effective, the reluctance to change within Congress is preventing it from becoming fully effective. For the acquisition streamlining initiatives to become successful, Congress must get out of the micromanagement role, as suggested by the Packard Commission (2:47).

While changing Congressional action is key to the success of acquisition streamlining, Air Force Under Secretary James McGovern had this to say about Congress' willingness to act on the legislative changes and reforms suggested by the Packard Commission:

Congress passed the 1986 Defense Reorganization Act, and overwhelmingly and enthusiastically embraced the Packard Commission report. But, it has not, and is not likely to, act on even the most minor changes and reforms called for in Congress itself. The bifurcated committee structure, the burgeoning staff, the micromanagement, the fouled up budget process--the congressional decision making machinery clearly is broken. And I see absolutely no evidence anybody over there seriously wants to fix it (2:47).

Jacques Gansler, faculty member at Harvard University Kennedy School of Government and former senior level executive in Defense and high technology industry, expressed a similar view. He thinks the plethora of new regulations and legislation has reached the level of absurdity. "The system is being so over-regulated, reformed and micromanaged that it is grinding to a halt" (5:18). Until Congress can change its legislative ways, and stop micromanaging the acquisition process, acquisition streamlining will not succeed.

Over-burdening legislation is a problem that must be fixed if anything is to be done to correct the industrial base problems. Industry is being disincentivized by Congressional attempts to tell industry how to run itself. Various attempts at increasing contract competition have resulted in a system that is more complex, time consuming and costly and have resulted in our increased dependence on off-shore production (13:25). Two initiatives, second-sourcing and teaming, were developed to increase competition. Second-sourcing occurs when production contracts are opened for competition on hardware that was developed, and in some cases previously produced, by a single contractor. Teaming occurs when the government encourages previously competing firms to combine their efforts on specific contracts (7:39). The intent of Congress was to reform the acquisition process, but the additional legislation has become over-burdening.

The increased use of practices such as second-sourcing and teaming is causing a great deal of concern among industry executives. While the increased competition is resulting in government savings, those savings are, in the words of General Dynamics executive vice president of finance, Standley Hoch, "putting pressure on our profit margins" (7:42). Weyman B. Jones, vice president for public affairs at Grumman, notes that while the government is acting to reduce the contractors' profit margins it is at the same time requiring the contractors to shoulder more risk because they will have to bear the costs of exploring promising technology with no guaranteed payback (7:40). The decreased profit margins and increased risk are causing some contractors to think twice about spending heavily on technical innovations. Wolfgang H. Demisch, aerospace stock analyst at the First Boston Corp., believes that the increase in legislation is causing superior technology and capability to be dissipated by freezing everybody into one technology approach (7:40).

The issue becomes how much profit the government wants to allow. While increased competition has lowered unit prices, we must ensure that we are not trading lower prices today for decreased capability tomorrow (5:19). In a recent meeting of the Joint Logistics Commanders, all agreed that competition in contracting was saving substantial amounts of money. Through competition, the Navy has already reduced its shipbuilding costs by \$2.5 billion (9:21). While increased competition has allowed tremendous savings to the government, it has been achieved at the expense of the very contractors the government is trying to induce into modernizing their facilities.

Another result of the increased emphasis on contract competition is the entry of foreign contractors, supported by their governments, into our defense markets. Since the foreign contractors have government support, they can underbid domestic contractors. Once they have been awarded the contract, they can develop new technology and processes that are used again to undercut domestic prices (14:2-2).

To overcome the increasing use of off-shore products and components and to increase productivity, DOD is emphasizing the Industrial Modernization Incentives Program (IMIP) and the Manufacturing Technology Program (MANTECH) (11:40). The IMIP program is intended to provide industry with incentives to invest in factory-wide modernization (11:40). By modernizing American factories, DOD is providing a method to manufacturers that will allow them to maintain their current profit percentages while reducing costs: in other words, increase productivity. This increase in productivity will make them more competitive on

the world markets and encourage them to manufacture their goods domestically rather than import them. The MANTECH program encourages the use of new technology on the factory floor (11:40). An example of what is being implemented is Computer Integrated Manufacturing where numerically controlled machine tools on the shop floor are controlled from a central computer. This eliminates the need for paperwork instructions, reduces the number of variances caused by human error, tremendously enhances the integration of design and manufacturing, and when fully integrated into the production plan, provides a low cost ability to small quantity production (11:41).

Both the IMIP and MANTECH programs are working with varying degrees of success. Several contractors have taken advantage of the incentives offered in IMIP and have extensively modernized their facilities. Too often they found that the modernization efforts were too program specific and difficult to apply to follow-on programs. Not enough planning was done prior to and during their installation and not enough training was provided to ensure the equipment could be efficiently run and maintained. While the overall program has enjoyed some success, it has not been as effective as hoped (16:17).

The MANTECH program is also enjoying some success, but is limited by the extensive capital investment required. Managers are reluctant to participate due to the long-term nature of capital investment. They tend to emphasize short-term objectives trying to maximize their return on investment. The result is a reluctance to invest in any capital investment programs unless a short-term profit is assured. Richard A. Stimson thinks that our emphasis should be changed from one of short-term objectives, where return on investment is most important, to one of emphasizing sales, market share, and customer satisfaction (11:41). Both programs are initially very capital intensive and suffer from the short-term objectives of many of today's managers. Until managers change their emphasis from short term profits to market share and quality, neither IMIP or MANTECH will be fully implemented on the scale hoped for by DOD (16:17).

Another attempt at solving the acquisition problems is the application of work measurement standards on defense contracts. The intent is to standardize all DOD manufacturing activity within a contractor's facility by making the contractor provide the government with manufacturing time standards for all components down to the sub-component level. This can be a tremendous aid in determining accurate production proposals since the contractor can determine exactly how long it should take him to build each component part. However, the development of standards can be very expensive and time consuming initially

while the contractor determines his time standards. Also, some manufacturing activities such as prototype building and one-of-a-kind builds present unusual problems and are very difficult to build to standards. Contractors are reluctant to develop standards and are extremely reluctant to provide Congress with the data that details their conformance to standards. This is due to the complexity of standards and contractors' lack of faith in Congress to accurately understand the conformance figures. Conformance figures will vary considerably from plant to plant, even with the same manufacturer, due to the large number of variables that effect conformance. Variables such as personnel experience, age of equipment, and morale can have a tremendous impact on conformance. If manufacturers are compared to one another by their ability to conform to standards with no explanation, the results can be very misleading (9:23).

Work measurement standards, properly used, can be a tremendous aid to a manufacturer. The problems DOD is having implementing them are due to the cost of their development and the reluctance of manufacturers to change their accounting systems. If a contractor has not been using standards, the cost to develop them can run into the millions of dollars. This is due to the unique and complex nature of the standards. They must be developed individually for each operation on each machine. The cost is usually passed on to the government in terms of increased contractor overhead, but the government is very reluctant to pay all the costs associated with standards development since they can be used on all products. The use of standards would require contractors to change their methods of cost accounting. Most have developed what they feel are accurate methods for determining costs and are reluctant to change a system they feel is perfectly adequate. Finally, contractors feel that work measurement standards are just another method being employed by Congress to look over the contractors' shoulders. To date, work measurement standards have not been widely accepted or implemented. Compromises between the government and contractors must be found before work measurement standards will be effective. The contractors' development and implementation costs must be decreased and the contractors must feel that information about their conformance to standards will not be misused (9:23).

One of the Packard Commission's principal recommendations was that Congress should change the way it authorizes and appropriates funds (3:31). Congress, until 1982, appropriated funds on a yearly basis. Contractors were very reluctant to order large quantities of material and take the risk of their programs being cancelled. Hence, they ordered supplies in much smaller quantities than needed for the complete program. The small lot buys and increased risk tended to

add to program costs. The commission recommended that stability in funding should be sought by biennial budgeting and greatly increased use of multi-year procurement. They went as far as to recommend major programs be funded for entire milestone periods like the duration of full-scale development or production (3:31). With multi-year contracting, not only are costs reduced, but contractors are willing to invest in modern technology since they are provided a reasonably stable business base. Numerous examples can be found of increased prime and subcontractor capital investments, enhanced technology modernization programs, and instances of enhanced vendor competition (17:1). In 1982, a four-year contract for F-16s resulted in over \$250 million of investments in new capital equipment at the subcontractor level. The NAVSTAR Global Positioning System (GPS) multiyear procurement generated over \$41 million in facilities expansion and capital investment (17:2). Clearly, multi-year procurement is a major improvement to the acquisition process.

In spite of its many successes, Congress is very reluctant to pass multi-year procurement legislation because of their lack of control over the program once the funds are appropriated. Once money is committed on a program, it is very expensive to withdraw that money. One of the purposes of yearly appropriations is to allow Congress to maintain tight control of the budget (3:31). Until Congress regains faith in the acquisition community, multi-year procurement, on a large scale, will not be likely.

Although there are numerous examples of success stories, in general, the U.S. has significant problems with its industrial base. Attempts are being made to solve some of the problems, but those attempts have been largely ineffective due to the inability of the Congress, industry, and DOD to work together to develop mutually acceptable solutions or have faith in the initiatives instituted by one another. The remainder of this paper will provide a plan that could solve the industrial base problems.



## Chapter Four

### THE SOLUTION

The actions that are implemented to solve the industrial base problems will first and foremost have to be actions that are understood and accepted by Congress. The very nature of Congress today is such that if they do not provide overwhelming support to the actions, they will fail. The way to do this is to develop a national industrial policy that will treat the defense and non-defense sectors nearly the same. Some favoritism will have to be given to the defense sector but only enough to assure critical system production capability within the U.S. By treating all sectors nearly the same, an industrial policy can be developed that will improve most American industry. Since the policy will improve industry in most regions of the country, most of the representatives should be in favor of it. An important point about the policy is the way it is presented to Congress and the American people. Only with their acceptance can it succeed. The ideas must be presented in a manner that is understood by all. Those presenting the information must be willing to do whatever is necessary to gain acceptance of the ideas.

The idea of a national industry policy is not a new one. Most major industrial nations today have one. We have one of sorts but it has proven to be ineffective in dealing with the world markets (16:5). To paraphrase William H. Taft, Deputy Secretary of Defense, "acquisition improvement and reform is historically an evolutionary process. . . . What worked in the past doesn't necessarily apply in the same way today" (12:9). The idea of a national industrial strategy that will improve all American industry, and treat both the defense and non-defense sectors the same, is a continuation of the evolutionary process. The organizational responsibility and implementation authority for the policy, sector-wide, should be high in the government, possibly cabinet level, due to the impact of decisions on defense policy, sources and timing of major weapons systems, and the capital investment required (16:14). In short, national industrial policy strategy should be made as part of U.S. national security strategy. A focal point should be established in Congress that has the authority to act on the behalf of Congress in matters pertaining to the industrial policy. That Congressional focal point must

work closely with the executive branch, DOD, and industry groups to implement the new industrial strategy.

The national industrial policy should have six prime objectives: the development of a research and development investment strategy, the creation of incentives for productivity improvements and decreased dependency on off-shore production, greater integration of civil and military production, ensuring large dollar resource commitments are directed into the right area, making defense industrial strategy part of the U.S. national security strategy, and ensuring that the U.S. has the ability to train our workforce to be able to work with and develop the technology necessary to keep our industrial base the world's best (16:15). These objectives are not an attempt to put a protectionist trade barrier in place. They are an attempt to enable the U.S. to overcome the disadvantage it has had in the past in dealing with countries that are taking full advantage of an integrated national industrial policy.

The industrial policy objective for the development of a research and development investment strategy calls for a shift from supporting a few major system developments to combining the development of new technology with the eventual low cost means of producing it. An example is the availability of computer-integrated, flexible automated production systems and their very limited use by the defense industry. With some exceptions, current policies disregard the new component, subsystem, and materials technology that is available. In addition, the potential of advanced manufacturing technology is not adequately emphasized (16:16). The need for a closer interface between the design and manufacturing communities has already been identified by the Comptroller General as a major element in the success of weapon system programs (16:18).

Obtaining incentivized productivity gains and reducing foreign dependency is the second objective of the national industrial policy. We presently put a great deal of emphasis on quality and increased productivity, but do it through regulations and directives. This objective would create an environment where increased productivity and higher quality would be encouraged and rewarded. The Packard Commission report recommended that successful commercial incentives be applied to DOD programs (16:20). A prime incentive is design-to-cost which seeks to obtain the best systems available at a pre-established, affordable market price. Using design-to-cost criteria, engineers are forced to address production considerations, as well as new materials and new technology, in the preliminary design (16:21). Everyone knows up-front what technology and materials are planned along with the associated prices. Productivity can be improved by

allowing contractors to share in the savings produced by implementing new technology and modernizing production facilities. This increases the contractor's profit margin while decreasing the overall unit cost. By improving productivity, we can make items less expensively, increase contractors' profit margins, and, in the long run, make domestically produced items cheaper. If cheaper unit prices are available domestically, manufacturers will buy their components domestically and U.S. markets will become more favorable to overseas buyers. Productivity is the key to slowing our drift towards foreign dependency. Although some foreign dependency issues are political, increased productivity will make domestic manufacturers more competitive on world markets and force them to think twice about sourcing their components overseas (16:10-14).

Far greater integration of civil and defense production is the third objective. A recent Defense Science Board Task Force found that greater DOD use of commercial components and systems could reduce costs by ten to one at the component level and by between four and eight to one at the system level (16:22). Commercial electronic components are seeing environments similar to those encountered by military systems and have higher performance and better quality because of large volume and extensive field experience. Even in the cases where DOD could not use commercial equipment, by encouraging the integration of commercial and defense production facilities, DOD could gain many of the same benefits. The integration of production facilities would provide production surge capability and allow the major capital investments being made by the DOD to be used on a multi-shift basis in the commercial sector, improving the overall national productivity (16:23).

The establishment of an industrial strategy for large resource commitments is the fourth main objective. Decisions here must be a function of the current status and structure of the industrial base. For example, if there are enough plants already in existence to build the limited number of aircraft that are planned over the next 15 years, then the continued modernization of one of the existing plants would be far preferable to starting up a totally new one (16:24). Decisions on resource commitments should be made with the knowledge of what weapon systems will be bought, when and where they should be built, and what the capital investment requirements are for each new major system.

Making the industrial base a key part of the U.S. national security strategy is the fifth main objective. It requires the government to view industrial productivity and responsiveness in the same light as the military forces--as a means of deterrence. The strength of American industrial power has long been

recognized by both our friends and adversaries. If America is to maintain its status as a major world power, we must ensure it stays that way.

The sixth and last objective, ensuring that the work force is adequately trained to develop and work with modern technology, is extremely important if we are to maintain a world pre-eminent position in science and engineering. TRW's Dr. Foster pointed out that foreign governments provide substantial commercial R&D support for applied research, innovation, and technology development to assist their emerging industries. American industry and government, on the other hand, have nearly an adversarial relationship (10:48). Government and industry must improve their relationship and develop procedures to ensure our pool of qualified people is sufficient to handle the technology necessary to maintain and improve our technological capabilities.

If the proper implementation tools are created, based on market incentives rather than government actions or regulations, an industrial policy can be implemented that will allow us to achieve our objectives and still maintain the strength of a free market economy. The tools that are developed to implement these strategies must be flexibly designed. Some should be usable in all sectors, some will need modification from sector to sector and some will have to be sector specific. All of these tools will have to be implemented in an environment that provides a much more stable budget than exists today. Contractors simply are not going to take the risks associated with long-term capital improvements and technical innovation without foreseeing steady cash flow. In addition to being flexibly designed, the implementation tools must be politically neutral. Dr. Donald A. Hicks alludes to a national industrial policy with his call for a congressional/industrial complex where objective analyses rather than political considerations drive the decision making process (4:12).

Implementation of a national industrial policy should be done on a sector by sector basis and across horizontal levels for critical component areas (16:8). For example a policy on forging should be implemented that is the same in all sectors. Since the forging industry is critical, program managers should be allowed to select only American contractors. Money should be set aside that can be used by the contractors on an incentive cost-sharing basis to ensure that American forging contractors have the equipment and capability to produce whatever forgings we need.

We must be careful not to think that we can solve all industrial base problems with improved technology. As Dr. Frisch points out, high technology

processes in peace time may reduce the surge capability necessary in war (15:10). Factories within each sector should be pre-selected, based on the complexity of the processes necessary for production. If the process warrants the introduction of technology to improve productivity and still maintain a surge capability, money should be provided through MANTECH and IMIP type programs that will enable that process to be modernized. Maintaining a surge capability may be difficult with increased modernization and process automation. When production processes are automated, they are designed with the ability to very efficiently produce in numbers up to the point where they are constantly running. To surge beyond their designed capability would be very difficult and very expensive. On the other hand, if the process does not warrant modernization or it is determined that automation will detract from its surge capability, the process should be left alone (15:10). Labor-intensive processes such as running cables through an aircraft fuselage are an example. Productivity increases in these cases can be achieved by modern management techniques and incentives. The bottom line is that technology cannot be used as the catchall to increase productivity, and when it is used, care must be taken to ensure a surge capability still exists.

The first step towards implementing a national industrial policy has already been mentioned; ensuring that everyone concerned understands and accepts the ideas and objectives of the national industrial policy. This is the cultural change called for by Richard Stimson. It must take place in all aspects of industry and government. The second step is to use the defense industrial base as a model for implementing the national industrial program. The influence of the defense base is found throughout the economy. Since the government is so totally involved now in the defense industrial base, it will be easy to implement visibility measures to ensure feedback. Most of those procedures have already been implemented in attempts to get feedback from acquisition streamlining initiatives. The final step will take place after the results of implementing a national industrial policy within the defense base have been assessed. The lessons learned in each sector can be applied across the entire industrial base as our industrial policies are implemented sector by sector.

## Chapter Five

### CONCLUSION

While many attempts have been made to improve the U.S. industrial base and its mobilization abilities, those attempts have been largely non-effective. The large defense budgets during the Reagan administration have masked the actual state of the U.S. industrial base. With future defense budget cuts, the actual state will become visible.

The records clearly show the need for a comprehensive policy designed to strengthen the overall U.S. manufacturing base. The economic and industrial policies that aid American manufacturing in general will benefit the defense industrial base. The best policy is one that fosters an economic climate where all manufacturing can survive (1:37). The policy should have the following six objectives:

1. Developing a research and development investment strategy.
2. Creating incentives for productivity improvements and decreased dependency on off-shore production.
3. Greater integration of civil and military production.
4. Ensuring large dollar resource commitments are directed into the proper areas.
5. Making defense industrial strategy part of the U.S. national security strategy.
6. Ensuring the U.S. has the ability to train its workforce to work with, and develop, the technology necessary to keep its industrial base the world's best.

The U.S. government and industry must give their full support to the development of such a policy if we are to maintain a world leadership position as an industrial power. Even though we are making improvements in the industrial base, we are not advancing rapidly enough to maintain a lead over the developing nations. The strength of our industrial base and its ability to support the wartime needs of the nation have been a major deterrent to war since World War I.

Unless immediate action is taken, we stand the risk of losing rapid industrial base mobilization as a major deterrent.

The requirement for implementing a national industrial policy exists more today than ever before. The idea is not new. Harvard University's Jacques Gansler has been advocating a national industrial policy since 1986 (16:3). The cost of modernizing our industrial base should no longer be an issue. The money can be made available if our nation decides that it wants to spend money improving its industrial base. National priority must be put on industrial base issues.

What we need is a political decision to support a national industrial policy that, once implemented, is removed as far as possible from politics. The first step is the cultural change necessary to make everyone understand that the way we have been doing business needs to be improved. Once that is understood the next step is up to Congress. They must begin passing legislation that will not establish trade barriers but enhance the ability of the industrial base to compete on world markets. Once the legislation is in-place, DOD and industry can work together to develop a policy. Once implemented and modified as necessary within the defense sector, the policy can be applied within all sectors of the economy.

Only with the aid of a national industrial policy can the U.S. solve its industrial base problems. At risk is the deterrence value of rapid industrial mobilization and the ability to sustain combat operations in a major protracted conflict. We cannot afford the consequences of waiting much longer to improve our industrial base. If we wait until the next war, we will have waited too long.

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